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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/786,778

02/25/2004

Masatomo Kojima

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04/04/2006

REED SMITH, LLP

ATTN: PATENT RECORDS DEPARTMENT  
599 LEXINGTON AVENUE, 29TH FLOOR  
NEW YORK, NY 10022-7650

EXAMINER

AGUIRRECHEA, JAYDI A

ART UNIT

PAPER NUMBER

2834

DATE MAILED: 04/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/786,778

Applicant(s)

KOJIMA, MASATOMO

Examiner

Jaydi A. Aguirrechea

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/06</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi (US6536880) in view of Murai (2003/0076007).

Takagi discloses a piezoelectric element comprising:

- a plurality of piezoelectric layers (21-30) formed of piezoelectric material;
- a plurality of electrode layers (35) which are stacked alternately with the piezoelectric layers; and
- at least one active portion which is provided by respective portions of the piezoelectric layers, such that each of said respective portions is sandwiched by corresponding two electrode layers of the plurality of electrode layers,
- said corresponding two electrode layers being opposed to each other in a direction of the alternate stacking of the piezoelectric layers and the electrode layers,
- said at least one active portion being deformed when an electric voltage is applied to the plurality of electrode layers.

However, Takagi fails to disclose the piezoelectric layers including at least one first layer having a first thickness, and at least one piezoelectric second piezoelectric layer having a second thickness greater than the first thickness.

Takagi discloses a piezoelectric actuator comprising piezoelectric layers (431 and 432) having a first thickness and layers (433-436) having a second thickness greater than the first thickness.

Takagi discloses "using such a structure makes it possible to obtain a piezoelectric thin film element with superior piezoelectric properties without affecting productivity or reliability" (see paragraph 0013).

Therefore, it would have been obvious at the time of the invention was made to use a second piezoelectric layer being thicker than the first piezoelectric layer since, as disclosed by Takagi, such a structure provides superior piezoelectric properties without affecting productivity or reliability.

With regards to claim 2, both references show the piezoelectric actuator being fixed to a diaphragm, and such actuators are used as an inkjet recording head, inkjet printer or other liquid ejecting apparatus. Note in Murai, the layer 436 being remoter from the diaphragm than layer 431.

With regards to claim 3, layers 431 and 432 form the first sheets and layers 433-436 form the second sheet, wherein the second number is greater than the first number.

With regards to claim 4, layers 431 and 432 have the same thickness.

With regards to claim 5, Takagi discloses piezoelectric sheets having a thickness of about 22.5  $\mu\text{m}$  to 30.0  $\mu\text{m}$ .

With regards to claim 6, Murai discloses the first piezoelectric layer comprising a single first piezoelectric sheet having a first thickness and a second piezoelectric layer comprising a second sheet having a second thickness.

With regards to claim 7, Murai discloses the thicknesses of the first layer to be 10-100nm and the thickness of the second layers to be 0.5-1.5  $\mu\text{m}$ .

With regards to claim 9, the actuator is fixed to a cavity unit having ink chambers to provide an ink jet printer head as explained above. Murai discloses electrodes 44 and 42 where electrode 44 is a common electrode. Takagi discloses common electrodes 35.

With regards to claim 8, it would have been an obvious matter of design choice to select the piezoelectric layers to include a first number of said first piezoelectric layers, and a second number of said second piezoelectric layer or layers, the second number being not greater than half a sum of the first number and the second number, since the applicant has not disclosed that selecting the specific number of layers solves any problem or is for a particular reason. It appears that the claimed invention would perform equally well with a greater number of second layers.

With regards to claim 10, Murai discloses the first and second piezoelectric layers having different thicknesses.

With regards to claim 11, the thicker piezoelectric layers (433-436) are considered restrictive layers restricting the deformation of the active portion.

With regards to claims 12-15 are rejected under Murai for the same reasons as explained above.

With regards to claims 16 and 17, Takagi discloses at least three electrode layers.

***Response to Arguments***

3. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.


***Conclusion***

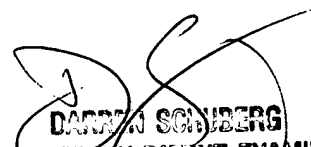
4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jaydi A. Aguirrechea whose telephone number is 571-272-2018. The examiner can normally be reached on M-Th 9-7.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren E. Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
JAA  
3/25/06

  
DARREN SCHUBERG  
SUPERVISOR IN PATENT EXAMINER  
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